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I.—THE COLOR-SYSTEM OF VERGIL.[1]

Charles Lamb used to say of himself that '*darkness was his hell.*' In the genius of this man there is a flavor of bright and sparkling childhood; and in making hell consist of darkness, he uttered a feeling that is common both to all children and to all nations in the childlike stage of their growth. Thus our *hell* itself, the Old Norse *hel*, the Gothic *halja*, is probably from the same root as the Greek κελαινός (black), personified as Κήρ, the goddess of death. So, in the very foundations of Indo-germanic speech, darkness is one with death; light is at once the essence and the symbol of physical life.

This childlike identification of *darkness* with *hell* came up, as we saw in Charles Lamb's case, from the first impressions of his childhood into the ripeness of the sensitive, thoughtful man. So, with the Greeks, the conception of darkness as the awfulness of death, the conception of life as the clear effulgence of light, lasted over, as an abiding element of their imagination, from primitive days into the consummate perfection of their poetry. In Euripides, for example, the dying Alkestis, as she feels the approach of death, cries out:

σκοτία δ' ἐπ' ὄσσοις νὺξ ἐφέρπει (269).

As she prays for long life for the children that she is leaving, it is:

χαίροντες, ὦ τέκνα, τόδε φάος ὁρῷτον (272).

As her women pray for her parting soul, her death is for them:

τὸν ἀνάλιον οἶκον οἰκετεύειν (437);

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[1] This paper was prepared for the Philological Association of the Johns Hopkins University, and read before that body on the 14th of April, 1882.

and the last farewell of the dying woman, as she goes down, willing but awe-stricken, into the Valley of the Shadow, is

> Ἅλιε καὶ φάος ἁμέρας.

So too, in Sophokles, the last words of Ajax, before he falls upon his sword, are

> σὲ δ' ὦ φαεννῆς ἡμέρας τὸ νῦν σέλας
> καὶ τὸν διφρευτὴν Ἥλιον προσεννέπω (856).

Thus, here and in countless other passages of like feeling, there comes out a law of the Greek mind, a fundamental fact of the Greek imagination at work: darkness is for the Greek the physical sign and expression of death; sunlight, in its white glow, in its shining, uncolored radiance, is the physical sign, the essence and expression of life.

In passing, however, from the poetic atmosphere of the Greeks into the Italians', there is a further progress to be marked in this conception of light as the essence, the metonym of life. See, for example, how the great Italian poet describes the growing horror of the scenes through which Aeneas went down from the sunlit life of man into the regions of the dead—

> rebus nox abstulit atra colorem (Aen. VI 272).

Here it is no longer mere light, it is color that emerges as the sign of life; and it is the loss of color that is the sign of death. To the eyes, to the minds, to the imaginations of the Greeks, the pure light of the sun, falling in undissolved whiteness, piercing, penetrating, almost blinding in its sharp etching of shadow and illumination, had been the glory of the physical universe, the charm of life, the symbol of all intelligence, the speech, as it were, and the revelation of the Godhead itself. Form, sharply defined in the black and white of the uncolored sunlight, was for Greek imaginations the type of the highest beauty. But the imagination of the Italians comes out in their best poetry as something less plastic than the Greeks', and more sensuous: light pours through the gorgeous realms of their poetic world, no longer white and undissolved, but broken into prismatic splendors of innumerable tints, reflected and refracted into all combinations of pure and of blended colors. Form is no longer so all-sufficing, so correct, so sharply defined as in the black and white, the lights and shadows, of the Greek ideals. But form illumined by colored lights, form losing the sharpness of its outlines in the tender vagueness of colors that melt and blend with one another, such is the highest beauty of the world as the world was seen by Italian eyes and painted by Italian poets.

Such was the Italian, such above all was Vergil's conception of the part that color, as distinguished from pure light, plays in the beauty of the universe. For him it was color that made the glory of life; it was the withdrawing of color that made the dreadfulness of the dead man's world. For him, however, this separation of color from light, this glorification of color at the expense of light, was accomplished only by the stress of a grand imagination. But for us, strange to say, we can find in the resources of modern chemistry the means of changing Vergil's imagination into scientific fact; we can separate light from color, and light up a dismal world of horrors from which all color is banished. We can see before us in the laboratory the very scene that Vergil makes Aeneas behold as he goes down alive in Hell. The process and the result of this wonderful experiment are well described in Rood's Modern Chromatics, pp. 102–3.

From the witnessing of such an experiment we shall come forth persuaded for ever of the fundamental truth of Vergil's conception: the glory of the physical universe consists, above all, in the diffusion of color; and the poetic conception and the presentation of life before the sensuous imagination are to be attained in their highest effects only by the management and utilization of color.

Among the great poets of Italy, the poets that saw and lived in color rather than in pure light the chief beauty of the universe, Vergil is the greatest. He made, as I shall show you, a prodigious use of color in his own compositions. He used a rich variety of color-terms with a delicate precision of meaning; and by his example he fixed the use of color-terms and defined the range of color-impressions for the poetic literature of his race. I wish, therefore, so far as I can, to lay before you the color-system of this great master of poetry. I wish to explain the color-terms that he uses, and to arrange and analyze the color-impression that he aims to create. In conclusion, by comparing the results thus obtained from Vergil with the results obtained by other scholars from Homer, I wish to show how far Vergil had advanced beyond Homer, both in his appreciation of color and in his precision of expression for color. By such a comparison, it seems to me that we shall reach a fair measure of the progress made by civilized mankind, within that thousand years, in the adaptation of human language to the color-sensations of the eye.

The first chromatic impression that the mind gets from reading Vergil is the impression of his delicate and loving perception of color, and of the splendid richness and variety of his color-effects. All through his poems, as well the poems of his sensuous youth as the poems of his sobered maturity, whether he is dealing with external nature or with human life, his verses are aglow with an iridescent radiance of color. Sometimes it is still-life, a flower or a fruit or a vegetable, pictured with delicate fidelity to nature's coloring. Sometimes it is a living animal, bird or snake, gorgeous with bright plumage or with lustrous scales. Sometimes it is the human figure itself, maiden or warrior, luminous with richness of flesh-tints or splendid in garments of many colors. Sometimes it is a landscape, or a sky-effect, cool with the green light of the forest or glowing with all the radiance of the sunset. Turn where you will, there is always color imprisoned in the sonorous beauty of the verse, until the gem-like Vergilian phrases seem to be alive inside with as many shifting hues as the beryl-stone of the poet. In the Aeneid, for example, 8, 22, he tells us how, in a basin fed from the brass lips of a fountain, the yellow light, flashing from the brass, is reflected from the water and sent flying in tremulous patches amid the carved work of the ceiling. In the second Eclogue, v. 50, the white-armed Naïd lights up the heaps of dark blue-berries with yellow clusters of marigolds. In the Copa, v. 20, there is the grouping of wreaths of yellow weld with purple roses, and brown chesnuts side by side with red-cheeked apples, and blood-red mulberries piled up with purple grapes and blue egg-plants. In one exquisite poem of the Catalecta, VI 10, there stands like a delicate vision of antique beauty the statue of Amor carved in white marble with wings of many-colored feathers. Rising from still-life to human life, he brings before us Aeneas himself (IV 261): his sword was starred over with tawny jasper, and the cloak that hung from his shoulders blazed with Tyrian purple, and the threads of the purple were held apart by slender threads of gold. So Chloreus (XI 771) shone with red and purple, and a gold bow hung from his shoulder, and his cloak was saffron-dyed and his leggings were embroidered with many colors. And in landscape, as he paints the site of Venice before Venice arose, his picture seems to glow with all the deep splendors of the Venetian painters: the Po through fat fields pours its yellow waters into a purple sea, Georg. 4, 372. And again, with what soft tenderness of color he pictures the fountain flowing from the dark mouth of the grotto: here there reigned the pinkness of spring; here the earth brought forth her flowers, and a white poplar hung over the mouth of the cavern, Ecl. 9, 40. And, in another place, as the boats full of armed men glide along the forest-river, the green woods gaze with amazement upon the shining shields of warriors and upon the brightly painted boats gleaming back reflected from the quiet waters, VIII 92. And at sunrise, the sea grows red beneath the level rays, and the yellow Dawn rides up the sky in her rosy chariot, VII 25. Oftenest, however, of all he comes back to the richest of all color-effects, to the rainbow, *mille coloribus arcum*, V 609. Art and science meet in the memorable description of Iris, flying dew-bespangled across the sky on saffron-colored wings, and drawing after her, as she faces the sun, a trail of a thousand colors, IV 700–1. Thus, in small things as in great, the visions of physical life and of ideal beauty that floated in the imagination of Vergil were visions as splendid in color, as thoroughly Italian in sensuous color-effects, as ever came in after-centuries to fix themselves upon the canvases of a Giorgione or a Veronese or a Titian.

At this point it will be well for us, before we go further, to settle in our minds the conception that lay for the ancient mind in the word *color*. For, in our modern speech, half unconsciously, we gather in from the results of science the scientific conception of things and the scientific meaning of words. But, if we deceive ourselves into applying to ancient words our modern scientific conceptions, we misunderstand the thinking of antiquity and bring confusion and disorder into all their poetry. For us moderns, under the teaching of Young and of Helmholtz, color is a subjective sensation produced upon three sets of nerves within the eye by three kinds of waves that differ in their length. When the longest wave strikes upon the nerves that are fitted to receive its impression, we see red; when the shortest wave strikes upon its nerves, we see violet; when waves of the intermediate length strike upon their nerves, we see green. And when waves of different lengths fall upon our eyes commingled, we see colors such as yellows, blues, purples, etc., made up of violet, green and red. A nobler theory was never devised by the wit of man to explain the phenomena of nature: the theory, for my part, takes already its place in discovered truth as a sublime law of nature, most exquisite in its adaptation of wave to nerve. We must, indeed, keep this theory to explain the facts of color as they arise in the world; but in dealing with the color-terms of ancient languages and in reconstructing the color-system of ancient poets, we must lay this theory aside and force ourselves back into the childlike conceptions that arose in the childhood of mankind. The noun *color* goes back to the root *cal*, I. G. *skal* or *skar*, meaning to *cover*, to *conceal*. It is akin to the verb *celare* (hide) and *occulere* (cover). "*Die Sprache*," says Prof. Curtius, p. 111, "*fasst die Farbe als Decke auf*." *Color* in the conception of Indo-germanic language is the *cover* of things. So in Greek, χρῶμα (*color*) is from the same root as χρώς (*skin*). In the I. G. languages, the color of a thing is the cover or skin that overlies or hides the true substance. From this conception, however false it may be in science, we have to make our start in explaining the color-terms of ancient poetry. If we apply it to Vergil, we shall find the term *color* used in several different senses. In its widest sense, Vergil uses *color* to denote the colored skin or cover that overlies all visible objects, *e. g.*

rebus nox abstulit atra colorem (VI 272).

Here *color* is a kind of skin that may be, as it were, peeled off. By metaphor drawn from this use, *color* denotes the surface as opposed to the substance, the appearance as opposed to the reality of things, *e. g.*

nimium ne crede colori (Ecl. II 17).

Next, by a natural transition, *color* denotes the dye-stuff used to give color to a foreign substance:

varios discet mentiri lana colores (Ecl. IV 42).

Then it may denote the dark spots lying on the surface of a bright body; so of the sun he says:

ipsius in vultu varios errare colores (Georg. I 452).

Then *color* is narrowed down to denote the warm colors, reds, browns, etc., even when darkened almost to black. So in speaking of color as test of the soil's fertility, he says:

promptum est praediscere, quis cui color (Gg. II 256)
coloratis amnis devexus ab Indis (Gg. 4, 293), (brown races, colored people).

And of the purpling grape:

duceret apricis in collibus uva colorem (Ecl. IX 49).

Then it denotes the same warm colors illuminated toward white. So he says of the woodpecker:

sparsit coloribus alas (Aen. VII 191).

And, by a special narrowing, *color* denotes the exquisite tints of red and white, rose and lily commingled, that make the complexion of a beautiful girl:

> Indum sanguineo veluti violaverit ostro
> Si quis ebur, aut mixta rubent ubi lilia multa
> Alba rosa: *tales virgo dabat ore colores* (Aen. XII 67).

Finally, by a still further mingling of white, *color* comes to denote the palest yellow, almost white itself; so he says of horses

> color deterrimus albis | et gilvo (Gg. III 82).

Vergil, you will remember, in speaking of the rainbow, called it *mille coloribus arcam.* Only by a bold guess, of course, by the lucky divination of genius, could he have given as one thousand the number of distinct colors in the solar spectrum. Yet, strange to say, Aubert has proved by his famous experiments and calculations (cf. Rood, p. 40), that in the solar spectrum, as spread out by artificial means in the laboratory or by natural means in the gorgeousness of the perfect rainbow, the unaided human eye can see and distinguish 1000 different colors. In addition, however, we must bear in mind that one of the colors commonest both in art and in nature, the purple, is not seen at all in the solar spectrum. Hence, in order to get the number of distinct colors that the eye can see in nature, to the 1000 hues of the perfect spectrum we must add on about 100 more for the full and the graded hues of purple. Let us assume, then, that, in nature seen under ordinary daylight, there are for the healthy human eye about 1100 distinguishable colors. By different degrees of white illumination, this number, as Aubert proves, can easily be carried up to 100,000 tints; and by illuminating the spectrum by colored light, red, green, violet, etc., the number of tints passes up into incalculable millions, into a mathematical infinity of possible colors. But let us keep to the 1100 colors as the norm for practical work.

Given, then, these 1100 colors that can be seen and known by the human eye, it is the task of human speech to furnish expression more or less adequate for this number of color-sensations. The power of the various languages to do this, a power that varies from the rude inadequacy of barbarous dialects up to the subtle discriminations and overflowing wealth of the most perfect languages, is no bad measure of the perfection of language for the expression of human needs. In English, for example, I find that Roget has given the number at 102. The power of the modern French, however, in the apt and clear expression of color, is recognized by philologians as one of the most mavellous facts of that marvellously rich and picturesque language, and is perhaps the highest perfection of color-expression ever attained by human speech. The number of color-terms in common use in modern French is said to be not much short of 500. How, now, does the Latin of Vergil stand in this comparison? Over what number of color-terms does the genius of the poet bear sway, in order to find linguistic expression for the beauties of color that he discovered in nature? How many, as it were, and what are the pigments that lie upon the palette of this exquisite painter of the world for the rendering of all his color impressions? A friend of Alma Tadema (Collier, *Primer of Art*, p. 55) has lately told us that this exquisite master of color reproduces his color-impressions of the antique world by a palette of 12 colors. As compared with this dozen real pigments of Alma Tadema, the palette of Vergil's vocabulary contains 27 terms of high color—rather more than twice as many. But, as I shall prove hereafter, the defects of his language compel Vergil to use for the expression of definite color many terms for white and black and gray, terms which in their scientific sense are not color-terms at all, but which in their poetic use are often the expression of real and powerful color, as seen under excess and deficiency of illumination. Of such terms for black, white and gray, there are 15 in Vergil's vocabulary; and if these 15 be added to the 27 terms of pure color, we have 42 pigments in the color-system of the Vergilian poetry. Compare now this number of 42 color-terms with the number, fixed above, of 1100 colors to be expressed by them. From the bare statement of this rough numerical relation, 42 to 1100, there follows one consequence of prime importance for the understanding of Vergil's color-system. Each color-term of the 42 must cover, on the average, the expression of 26 closely allied tints. For each color-term, therefore, we must seek to find one precise color, as the norm, and, as it were, the center or axis of its chromatic power. This, if fixed by the color of some object in physical nature, unchanged and unchangeable, will serve us as the natural or physical standard of that particular color-term. For *sanguineus*, *e. g.* we shall have *sanguis*. But on both sides of that physical standard we must expect to find a group of allied tints, expressed, indeed, by the same color-term, but grading off tint by tint, up and down the vertical spectrum, toward the color-terms that lie nearest. In *caeruleus*, for example, there must lie not only the meaning of pure blue, as found in *caelum*, but also on both sides of blue a large number of distinct tints, closely allied to blue, but grading off, tint by tint, on the upper side toward green, and on the lower side toward violet. Here is the natural infirmity of language; no language, however rich, however precise, can ever be so developed as to cover the absolute infinitude of man's perceptions and sensations. Every human soul in its efforts at utterance is doomed to everlasting failure; the finite expression cannot be so stretched as to cover the infinite realities of things.

In understanding Vergil's poetry, therefore, we are forced to give to each color-term that he uses a somewhat widened range of tint-variation. Bearing this in mind, let us now arrange the color-terms of Vergil in their allied groups, according to proximity of tint in the spectrum of nature.

Following the theory of Helmholtz, a theory that I accept as a demonstration, I shall give first the three primary groups of red, green and violet; then the group that lies between red and green; then the group that lies between green and violet; lastly, the tints of so-called purples and blacks and grays and whites that, although occurring in nature, do not occur within the spectrum itself. But, in giving this catalogue of Vergil's color-terms, I wish to do more than simply to mark the existence of each particular color in Vergil's great picture of the universe. I wish to give a quantitative estimate of Vergil's use of the different colors. If we can fix the number of times that Vergil makes use of each color, we shall be able to discover his color-preferences, and to find out how far the color-sense of Vergil corresponds with the diffusion of color in nature; that is, how far the poetic presentation agrees with the realities of things. The color-sense of every great artist is an important element of his genius, a strongly marked characteristic of his artistic manner and range of perception. In painting, for example, it is obvious to all that love the art, to all that have striven to understand the work of any great man, that to the eye and to the taste of every original painter certain groups and ranges of color are distinctly preferable to certain others. These preferences and partialities are so strongly marked in each man's works as to be a striking characteristic of his genius. Amid the vast infinities of nature's coloring, no single eye is capable of finding equal joy in all the colors that make up the color-effects of the universe; no genius for coloring is so vast and so catholic as to be able to take in and reproduce in an equable manner all the coloring of nature. Hence, to use familiar examples, the splendid genius of Turner and the calmer, truer genius of Ruisdael are almost complementary to each other in the preference shown for the warm colors and for the cool colors of the spectrum, for the sunset glories and for the forest-tinted greens of the landscape. The sombre, brownish magnificence of Piloty's Death of Wallenstein differs as much from the glowing splendors of Paul Veronese's banqueting-scenes as if the two painters had looked out on different worlds of color.

As it is in painting, so it is in poetry. To each poet's eyes the world puts on a different aspect. Each poet, if we watch him at his work of representing nature as he sees it, will show a preference for certain ranges of color and a distaste for certain others. Thus, in studying the color-system of Vergil by its quantitative use of color-terms, we shall be able, in a general way, to see with his eyes the aspect of the physical universe, to learn his likes and his dislikes in color-effects, and to understand how far his genius conforms to the realities of nature in the diffusion and prevalence of color as an element of beauty.

I. Red group of color-terms.—Ruber, used 36 times; rutilus, 5; sanguineus, 14; cruentus, 2; sandix, 1; minium, 2; ferrugo, 5; roseus, 12. Total of red group 77.

II. Green group of color-terms.—Viridis, used 63 times; vitreus, 1; hyalus, 1. Total of green group 65.

III. Violet group of color-terms.—None used with exclusive and absolute precision of tint.

IV. Group of color-terms between red and green.—Igneus used once; spadix, 1; fulvus, 20; flavus, 19; croceus, 16; luteus, 5; aurum, 33; gilvus, 1; cereus, 1. Total of red-green group 97.

V. Group of color-terms between green and violet.—Pallidus used 24 times; lividus, 2; caeruleus, 31. Total group of green-violet color-terms 57.

VI. Outside group of color-terms not belonging in spectrum, but formed by composition. Purpureus used 33 times, puniceus 7, ostrum 11, murex 3; red and blue 54. Albus 38, candidus 37, niveus 18, decolor 1, argenteus 2, lacteus 5, marmoreus 6; formed by blending, more or less perfect, of complementary colors 107. Canus 13, glaucus 9, ater 72, fuscus 4, fumeus 1, niger 41, pullus 1, piceus 2; formed by the darkening, more or less complete, of each color 143.

Thus, in Vergil, if we include the so-called blacks, whites and grays, there are 600 uses of color-effect; but, if we leave out the blacks, whites and grays, there are 350 uses of bright color in the poems.

Later on we shall compare this diffusion of the different colors in Vergil's poetry with the actual diffusion of the same colors in the physical universe, and work out some interesting results. But, before this comparison can be made, we must find out some philological system, some method of hermeneutics, by which we can fix more precisely the color-significance of each color-term itself.

The color of anything in nature, whose color is visible to the human eye in any given position, depends on at least three elements that are always present, the three so-called *constants of color*, cf. Rood, ch. III, and pp. 209–10. Think, for example, of a mass of green leaves hanging as foliage upon a tree. The color of that foliage will depend

1st, on the wave-length of the waves of light reflected from those leaves into your eyes. That is *hue*, absolute color, as element in color-perception.

2d, on the amount of green light that is reflected from the leaves into your eyes. That is the *brightness* or *luminosity* of the color as an element in the color-impression.

3d, on the amount of white light that is mingled with the green light in the final color-impression. This is the *purity* of the color. If all white light could be removed, a thing impossible to do, the color would be absolutely pure; as the amount of white light is increased, the purity becomes less and less. At last, by excess of white light, all color may be made to vanish into whiteness.

From the clear understanding of these three elements of color, you will see that there can be no objective fixedness in our color-impression of any visible object. The hue may abide the same, but accidental variations in purity or in luminosity may make the color-impression vary in ever-shifting tints from what approaches blackness up to what approaches whiteness. As the distance varies, as the laws of aerial perspective work their will upon objects more near or more remote, dark objects become lighter when afar off, light objects become more vivid when near by. Now the color-terms of the poet, like the pigments of the painter, are not meant to define the absolute color of things; the mere wave-lengths of the waves of light that each thing reflects are not to be defined in the language of art. The poet like the painter records not what the thing is in itself, but what the thing seems to be in his eyes under all the circumstances that surround it. From this it comes to pass that objects which seem to us altogether different in color are often presented by the poet under the same color-term. Thus, under process of darkening, from defect of luminosity, the green of the fresh-cut foliage and the red of flowing blood are both called by Vergil *ater*, *ater sanguis*, Gg. III 507, and *frondibus atris*, Aen. VI 215. And again, under variations of purity, by contrast with different surrounding colors, the color of the same object may be expressed by two different color-terms. For example, in the same book of the Aeneid, V 309 and 494, the foliage of the olive is at one time *viridis*, at another *fulva*. Unless you can make plain to your minds the variations in our color-perceptions that are produced by variations in luminosity and purity, above all the variations produced by contrast, you can never hope to understand the use of coloring in painting nor of color-terms in poetry. Who, for example, that has seen the blue-green waves of the ocean blanch into whiteness under the red light of the setting or the rising sun can fail to understand why Vergil calls the sea *marmoreum aequor?* The poet's eyes saw in nature and painted in language the exact effect which is produced in the laboratory by throwing red light on a blue-green surface, Rood, p. 153.

From the point that we have reached we can come back to the practical problem that color-terms present to the mind of the philologian. If color be a thing so variable and so unfixed, by what means known to philology are we to fix the meaning, and to understand the use, in any ancient writer, say in Vergil, of the color-terms that he employs? Upon this problem as it arises in Greek philology, the minds of many Greek philologians have been of late keenly directed. But in their investigations, full of learning and full of charm as they are, it seems to me that there have been such grave mistakes of method as to rob their conclusions of permanent and solid value. I am not without hope, therefore, that by examining the color-system of a single great poet, especially of one so fond of color and so versed in color as Vergil, we may be able to learn some facts, perhaps even to establish some laws of interpretation, that may be of use in defining the color-terms of other ancient writers and of other ancient languages, above all, where we need it most, in the Greek. My own conclusion is that, in order to understand the meaning of any given color-term, we must work up to one final result by five successive stages of methodical investigation.

1st. The etymology of the color-term must be studied. If we can trace the word backward to its root and discover and compare its cognates, we shall find the fundamental conception, the concrete significance, that underlies its use, *e. g.* the derivation of *gilvus* from the I. G. root *gar* (shine, bright) and its connection with *bilis* in Latin, with γελεῖν (=λάμπειν, ἀνθεῖν Hesych.) and figuratively γελᾶν in Greek, with *yellow* in English, are full of help.

2d. The physical standard of the color must be fixed. We must try to find in nature some fixed and permanent standard of the color-term in question, some visible object that may fix the color for our eyes, and make us able to visualize, as it were, the color-impression of the ancient poet, *e. g.* the splendid pure red of *sandix* is fixed for ever in the mind of one that has ever looked upon the mineral (*realgar*, red sulphuret of arsenic) in which it occurs.

3d. The extension of the given color up and down the gamut of the spectrum must be determined, *e. g. caeruleus* running up almost to green and running down almost to violet.

4th. The variation of the color under different degrees of purity and luminosity must be determined, *e. g. purpureus* may lighten up into the softest shades of pink, or darken until it loses itself in a kind of violet blackness.

5th. The variation of each color by contrast, in combination with other colors, must be studied; and it will explain the most violent use of the color-terms, *e. g.* a wreath of olive leaves around a head of black or brown hair will seem yellowish and be called *fulvus;* but around a head of yellow hair will seem intensely green and be called *viridis.*

In separate essays, I hope to publish, so far as Vergil is concerned, my determination of his various color-terms according to this five-fold method of investigation. For the present I cannot do more than give in the fewest words the etymology and physical standard of each term.

Ruber. I. G. *rudh*, name of blood and of planet Mars, cognate with ἐρυθρός, *red*, *ruddy*, etc. Physical standard, the color of the crab when cooked, *rubentes ure foco cancros.* Gg. 4, 47.

Rutilus. I. G. *rudh*, akin to *ruber*, with red verging toward yellow. Physical standard, the splendid color of the Italian bee, *rutilis clarus squamis.* Gg. 4, 93.

Sanguineus, from *sanguis.* I. G. *sag* (drop, flow), cf. Latin *sucus.* Physical standard, color of fresh blood dropping from wound, blood itself, mulberry.

Cruentus, from *cruor*. I. G. *kru* (hard), cf. *crudelis*, κρύος, κρύσταλλος, etc., Eng. *raw*. Physical standard, *cruor*, blood hardening and darkening after it has left the body. Myrtle-berries show very dark red, *cruenta myrta*. Gg. 1, 306.

Sandix, Gr. σάνδυξ. Etymology unknown to me. Physical standard, *realgar*, red sulphuret of arsenic, used as dye-stuff. Ecl. 4, 45.

Minium. Etymology unknown to me. It is said to be an Iberian word. Physical standard, cinnabar, vermilion, used as rouge. Ecl. 10, 27.

Ferrugo, iron rust, from *ferrum*. Physical standard fixed in nature. The color of the larkspur, dark red, rather dull, *ferrugineus hyacinthus*. Gg. 4, 183.

Roseus, from *rosa*, probably of Semitic origin. Physical standard, rose-red with blue tinge, light or dark, red lips of beautiful women. Aen. 9, 5, etc.

Viridis. I. G. *ghvar*, *ghar* (sprout, grow). Physical standard, young leaves of trees, young grasses.

Vitreus, from *vitrum* (glass). I. G. *vid* (to see). Physical standard, greenish antique glass, of transparent green, *vitrea Fucinus nuda*. Aen. 7, 759.

Hyalus, Gr. ὕαλος (raindrop, glass). I. G. *su* (drop). Physical standard, glass of deep green color, *hyali saturo fucata colore*. Gg. 4, 335.

Igneus, from *ignis*. I. G. *ag* (move, flicker). Physical standard, fiery red of sun presaging wind-storm, (Sol) *igneus Euros*. Gg. 1, 453.

Spadix, Gr. σπάδιξ, date-palm, name from Semitic. Physical standard, date, rich red brown, used of bay horse, *honesti spadices*. Gg. 3, 82.

Flavus, root *ghar* (grow, sprout), cf. *viridis*. Physical standard, ripening grain, Tiber at Rome, according to Fronto's definition made up of green and red raised by white, *paullatim flavescet campus arista*. Ecl. 4, 28.

Fulvus, root *ghar* (grow, sprout), cf. *viridis* and *flavus*. Physical standard, skin of lion, plumes of eagle, according to Fronto's definition, the same as *flavus*, with white left out, *fulvus Jovis ales*. Aen. 12, 247.

Croceus, from *crocus* (saffron), Semitic word. Physical standard, saffron itself, used as dye-stuff, yellow tinged with red, *crocumque rubentem*. Gg. 4, 182.

Luteus, from *lutum* (weld). Root *lu* for *hlu* for *ghlu* for *ghar* (sprout). Physical standard, weld itself, used as dye-stuff, yellow with less red than *croceus*, *e. g. Aurora lutea in roseis bigis.* Aen. 7, 26. Yellow seems more yellow seen against red.

Aurum (gold). Root *aur* = *aus* = *vas* (burn, blaze), cf. *Aurora*, etc. Physical standard, gold itself, yellow with lustre, becoming reddish by reflection, *sol aureus.* Gg. 1, 232.

Cereus, from *cera.* I. G. *kar* (to separate), κηρίς. Physical standard, wax, yellow plum.

Pallidus. Root *pal* (greenish-blue, or bluish-green darkened). Germ. *fahl.* Physical standard, brunette complexion after death or in violent fright, *Dido pallida morte futura.* Aen. 4, 644.

Lividus. Root *liv* (gray-blue). Physical standard, *lead*, *glandes liventis plumbi.* Aen. 7, 687.

Caeruleus, from *caelum.* I. G. *kav* (hollow, vault). Physical standard, blue sky, normal tint of Mediterranean, *caeruleo sunt nomina ponto.* Aen. 12, 182.

Purpureus, *purpura*, Gr. πορφύρα. I. G. *bhar* (wave, agitate). Physical standard, murex, or sea-snail, magnificent color formed by union of red and blue, ripe grape, *purpureae vites.* Gg. 2, 95.

Puniceus, from *Punicus*, from *Poenus*, origin of the color from Carthage or Phoenicia. Physical standard, murex itself. It seems to have more red than *purpureus*, *puniceis rosetis.* Ecl. 5, 17.

Murex. I. G. *mar*, *smar* (rub, stain, smear), name given to the dye made from sea-snail. Physical standard, itself, as dye-stuff, *Tyrio ardebat murice laena.* Aen. 4, 262.

Ostrum. Gr. ὄστρειον, oyster, shell-fish. I. G. *as* (cast off, throw away). Physical standard, same as above, inclining strongly to red, *ebur violare sanguineo ostro.* Aen. 12, 67.

Albus. I. G. *albh* (white, dull white, approached either through yellow or through blue), cf. ἄλφι, ἀλφός, etc. Physical standard, white, or albumen, of egg, blue-white. Sulphur, yellow-white, *sulfurea Nar albus aqua.* Aen. 7, 517.

Candidus. I. G. *kand*, *skand* (shine, glow with heat), cf. *incendere*, κάνδαρος (live coal). Physical standard, lily glowing white against dark green leaves, white horse in sunshine, feeding in field of grass, etc., *candida viridi in litore conspicitor sus.* Aen. 8, 83 (*fetu albo*).

Niveus, from *nix.* I. G. *snig* (wash, cleanse). Physical standard, *nix*, generally a cold, bluish white, but changing with atmospheric conditions.

Argenteus, from *argentum*. I. G. *arg* (shine, glitter), cf. ἀργός. Physical standard, silver, white with metallic lustre, goose, dolphin.

Lacteus, from *lac*. I. G. *glakt* (milk). Physical standard, milk itself, soft, creamy white.

Marmoreus, from *marmor*. I. G. *mar* (shine, shimmer), cf. μαρμαίρω (shine), μαλός (white), etc. Physical standard, white marble, white with lustrous surface.

Decolor, from *color*. Physical standard, the dull, bleached whiteness of old age, in complexion and hair, *decolor artus*. Aen. 8, 326.

Canus for *casnus*. I. G. *kas* (shine), cf. *cascus* (old). Physical standard, silver-gray hair and bud, shining but yellowish.

Glaucus. Gr. γλαυκός, root *gal* (cf. *gilvus*), bright. Physical standard, sea agitated with foam-crested waves, bluish gray.

Ater. Root *aed*. I. G. *idh* (burn), blackness as the result of burning. Physical standard, ashes, *cinis ater*, what is left after all color is burnt out = *decolor*, notion not positive but negative.

Niger. I. G. *nik*, *nak* (slay, kill), cf. *nex*, *nox*, *nocere*, νέκυς, etc., blackness as color of night and sign of death and evil, blackness approached through violet (viola), through green (ilex), through blue water, through red (negro), through yellow (wet sand).

Fuscus = *fur-scus*, root *fur*. I. G. *bhar* (shake, agitate)—cf. *Furiae*—blackness approached through red and brown. Physical standard, negro's complexion, Mor. 33, night-bird's wings.

Fumeus, from *fumus*. I. G. *dhu* (boil, smoke). Physical standard, *smoke*, with blue or brown tinge.

Pullus. I. G. *pul*, cf. *pallidus*, etc., bluish gray approaching blackness. Physical standard, spots on sheep. Gg. 3, 389.

Piceus, from *pix*, *pic*. I. G. *pi* (squeeze), cf. *pinus*, πίσσα, etc. Physical standard, *pitch* itself, dirty, dull black, sweat mingled with dust running down the face. Aen. 9, 813.

After thus fixing the etymological force and the physical standard of each color-term that Vergil uses, the method of our investigation would lead us to fix for each color its limits of variation under possible changes of purity, of luminosity and of contrast. In my own studies for this essay I have worked out, in this way, all the variations and applications of each separate color-term. The details of this study have, indeed, a mighty charm for the student that deals with them by combining the principles of philology with the principles of scientific chromatics; but the presentation of these details, case by case, would lead rather to a series of separate monographs than to a general discussion of Vergil's color-system. As general result of my separate studies, I may boldly say that in no single case does Vergil ever extend the use of any color-term beyond what science recognizes as the possible limit of its extension. His application of his color-terms is often imaginative and sometimes startling; but there is no Vergilian application of any color-term that is not correct and even accurate according to the principles of chromatics. Leaving this subject, then, as unfit for discussion except in special treatises, I pass on to the last great question that is involved in the color-system of the poems. Is any comparison possible between color as imagined in the poems of Vergil and color as diffused in the visible objects of the universe? How far does the color-system of Vergil agree with the color-system of nature? In the distribution and quantities of each color respectively, how far does the world as represented in Vergil's poems agree with the world that actually exists?

Color, as we know, arises in nature from the breaking up of white sunlight, by absorption and reflection, into colored lights of various hues. The spectrum gives us power to break up the sunlight at pleasure; it even gives us power to measure with absolute accuracy the fractional amount of each color that is present in every unit of white light. In every thousand parts of sunlight, each color, red, green, violet, etc., is present in a fixed proportion; consequently, amid all the infinite play of colors that makes the ever-varying charm of the visible universe, however various the combinations, there is a fixed and unvarying quantity of each color always present. In every 1000 parts of white sunlight that beats upon the earth, there is of red light 330 parts, red-yellow 155, yellow 110, green 87, green-blue 67, blue 74, violet 177.

As said above, if we leave out the terms for white, gray and black, there are in Vergil's poems 350 uses of high color. That is, in every thousand parts of light, as the world showed itself to Vergil, of red light there were 220 parts as opposed to 330 in the spectrum; red-yellow, 117 as opposed to 155; yellow, 160—110; green, 186—87; green-blue, 74—67; blue, 88—74; violet, 0—177. That is, the world of Vergil's imagination, as compared with the real world, is defective in red, red-green and violet, and is excessive in yellow, green, blue and blue-green; or, to put the same facts into a more convenient form, Vergil's sense of color is fullest at the middle of the spectrum in yellow, green, green-blue and blue, and is defective at both ends, in red and red-yellow and especially in violet.

The excess is to be explained by the poet's preference for warm colors over cold and for the more luminous over the less luminous colors. The warm colors are, in painter's language, the reds, red-yellows and yellows that make the upper half of the spectrum. Of these there are in Vergil 497 parts in the thousand; but Vergil's purple also is a warm color because of the red that is in it, and of purple he has 154 parts. Thus, in every thousand parts of light, Vergil saw 651 parts of warm color as opposed to 349 parts of cold color. But in the spectrum there are 595 parts of warm color as opposed to 405 parts of cold color. Thus the genius of Vergil, in his picture of the universe, errs from the exact truth of nature by an excess of warm coloring. The poet's imagination, to that extent, idealizes the facts of nature by a warmer and brighter presentation of the visible world. His world stands to the real world as a portrait by Titian to the face of the human original. Again, in respect of luminosity, the colors of the spectrum grade downward from yellow, the most luminous, through green and red and blue to violet, the least luminous of all. Here, too, as idealizing artist, Vergil prefers the luminous colors. In yellow, for example, he has 160 parts against 110 of the spectrum; in green he has 186 parts against 87 in the spectrum; in reds including purples he has 374 parts against 330 in the spectrum. But in blues he barely reaches the proportion of the spectrum, and in violet he is totally deficient (0 against 177).

These facts are all significant of Vergil's genius. His perceptions of color are clearest and strongest at the middle of the spectrum; even in his sensuous imagination he is temperate and reserved, avoiding the extremes of sensation, and dwelling by preference upon the mean terms, the *media via* of visual perception. But, in lighting up his imaginary world, he is, in his perfect art, not realistic but boldly an idealist. By unconscious selection he floods his canvas with the warm glow of reds and purples and yellows, and brings down the use of cold colors far below the measure of their actual diffusion. And again, with the eye of the poet, anticipating the analysis of science, he discerned the colors that had the highest degree of luminosity, and lifted his glowing picture of the world far above the actual light of nature, by giving preference to the colors that are the most luminous, the most effective and far-reaching as well upon the eyes as upon the imaginations of mankind. Thus, even in this point of color, the works of Vergil's genius stand out as creations of a nobly ideal art, temperate in all things, wonderfully true to nature, but rising boldly above nature both in the luminosity and in the warmth of their coloring.

But the color-system of Vergil differs most from the color-system of nature by the total absence from it of violet. In the solar spectrum, as we saw, in 1000 parts of white light there are 177 parts of violet; but in Vergil's spectrum there is no violet at all, and the spectrum ends after *caeruleus* in *niger*. This absence of violet from the Vergilian system is strong confirmation of the theory that the conscious perception and the naming of the colors have followed a law of natural sequence. Those colors that produce the strongest effect upon the eye were the first to be noticed and the first to be named; and the strength of the color-effect and, therefore, the priority of the color-term are dependent upon the wave-length of the color itself. Thus red was the first color to be noticed and to be named; then orange, then yellow, then green, then blue, then at last violet. For example, when the Homeric poems were composed, red, orange and yellow were the only colors much noticed or distinctly named; green was the frontier-color; blue and violet were unnoticed and unnamed. But mankind grew on both in its observation of color and in its power of giving names to the colors observed.

A thousand years passed by. Vergil came forward, as the poet of the Roman empire and of the Italian people, to give us his poetic representation of the world. See now the advance in color from Homer's time to Vergil's. Green is added on to red and yellow as part of the color-system of nature, and blue is added on to green. But at blue the progress is arrested. Of violet, the last color of the spectrum, the color of the shortest wave-length, there is in Vergil no conscious vision and no distinct name. But the genius of Vergil stands on the very verge of the final discovery. The lovely color that lies below blue, closing the glories of the spectrum, as we can see by many allusions in Vergil's poems, was dimly present before his eyes and in his imagination. His genius was already laboring at the task of giving to it expression in language. Sometimes it is by *niger* that he seeks to express the mysterious color through which blue light passes into blackness. Sometimes by a confusion of sight which still prevails among more than one-half of civilized men, he confounds violet with purple, and calls it *purpureus*. In one line of exquisite beauty he combines the two methods, in order to find expression for the violet color that floated as a distinct impression before his mind:

> *violae sublucet purpura nigrae* (Gg. IV 275),
> "The purple of the black violet tones down its color."

Here, then, in this attempt of Vergil to complete his color-system by the discovery and naming of violet, we must take our leave of the great poet that stands half-way, as it were, between Homer and Göthe.

He had advanced beyond the point reached by Homer in substituting varieties of color for degrees of light, as the prime beauty of the physical universe. He had enlarged the spectrum of poetry by carrying his perception of color down from green through blue to the very verge of violet. Above all, he had given precision to the color-terms of his own language, and painted for us a world in which simple colors and combination of colors are worked into an almost perfect glory of color-effects. And even in respect of violet, although he did not succeed in expressing what he saw, he felt the color-impression that he could not name; the poet's eyes had been blessed with the dimly felt sensation of that color which is the last exquisite perfection of the spectrum.

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